Double (Bilinear) Interpolation Calculator

Value of a quantity at (x, y) inside a table with two inputs, such as superheated steam tables by pressure and temperature, by interpolating along both directions.

Method: Bilinear interpolation

Input parameters

Unit system: SI

Parameter	Value	Unit
First x (for example pressure)	10.000	
Second x	15.000	
First y (for example temperature)	250.00	
Second y	300.00	
Value at (x_1, y_1)	2,943.2	
Value at (x_1, y_2)	3,051.7	
Value at (x_2, y_1)	2,924.0	
Value at (x_2, y_2)	3,038.2	
x wanted	12.000	
y wanted	280.00	

Calculated results

Parameter	Value	Unit
Interpolated value at (x, y)	3,002.0	
Value at (x, y_1), first step	2,935.5	
Value at (x, y_2), first step	3,046.3	

Formula and method

$$z_a = z_{11} + f_x(z_{21} - z_{11}), \quad z_b = z_{12} + f_x(z_{22} - z_{12})$$
$$z = z_a + f_y(z_b - z_a), \quad f_x = \frac{x - x_1}{x_2 - x_1}, \; f_y = \frac{y - y_1}{y_2 - y_1}$$

Variables

x_1	First x (for example pressure)	-
x_2	Second x	-
y_1	First y (for example temperature)	-
y_2	Second y	-
z_{11}	Value at (x_1, y_1)	-
z_{12}	Value at (x_1, y_2)	-
z_{21}	Value at (x_2, y_1)	-
z_{22}	Value at (x_2, y_2)	-
x	x wanted	-
y	y wanted	-
z	Interpolated value at (x, y)	-
z_a	Value at (x, y_1), first step	-
z_b	Value at (x, y_2), first step	-

Method and standards

Linear interpolation in one direction, then in the other.

Assumptions and limits

- Bilinear within one cell.

References

- Bilinear interpolation

Report details

Report reference	FCC-PS48-3T2H (the same inputs always give the same reference)
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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/general/geometry/double-interpolation

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.